PENGARUH MODIFIKASI ZEOLIT ALAM DENGAN HEKSADESIL TRIMETILAMONIUM ($HDTMA^+$) PADA KEMAMPUAN ADSORPSINYA TERHADAP ION Pb^{2+} DAN Cd^{2+}

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RINGKASAN

Zeolit merupakan mineral aluminasilikat dengan struktur kerangka tiga dimensi, memiliki rongga serta saluran yang saling berhubungan menyebabkan bagian permukaannya menjadi sangat luas dan efektif sebagai adsorben. Selain itu, zeolit juga memiliki muatan negatif yang dapat berinteraksi dengan senyawa atau molekul bermuatan seperti heksadesiltrimetilamonium ($HDTMA^+$).

Telah dilakukan modifikasi terhadap zeolit alam (ZA) secara langsung dengan $HDTMA^+$. Perlakuan modifikasi dengan $HDTMA^+$ secara tidak langsung yaitu melalui proses dealuminasi meliputi pelarutan zeolit alam (ZA) dalam akuades panas yang dilanjutkan dengan perendaman selama 3 jam dalam larutan garam amonium heksafluorosilikat (AHFS) 1 M pada suhu 90^0C. Proses modifikasi dengan $HDTMA^+$ dilakukan pada konsentrasi 0, 0.125, 0.25, 0.5 dan 1.0 M dan dishaker selama 8 jam dengan kecepatan 150 rpm pada temperatur kamar. Karakterisasi adanya $HDTMA^+$ dalam zeolit alam (ZA) dan zeolit alam terdealuminasi (ZAD) menggunakan spektroskopi FTIR. Uji adsorpsi terhadap ion timbal(II) dan kadmium(II) dilakukan pada kedua zeolit termodifikasi dengan menggunakan *batch shaker* selama 24 jam pada kecepatan 150 rpm. Ion Pb^{2+} dan Cd^{2+} yang teradsorpsi ditentukan melalui pengukuran menggunakan spektroskopi serapan atom (AAS).

Spektra FTIR menunjukkan bahwa $HDTMA^+$ telah terserap pada kedua zeolit termodifikasi. Hal ini ditunjukkan oleh adanya serapan pada daerah 2850,6 cm^{-1} dan 2920 cm^{-1}. Intensitas serapan pada zeolit alam (ZA) lebih tinggi jika dibandingkan dengan zeolit alam terdealuminasi (ZAD). Hasil adsorpsi menunjukkan bahwa zeolit yang dimodifikasi dengan $HDTMA^+$ masih memiliki kemampuan dalam mengadsorpsi ion Pb^{2+} dan Cd^{2+} tetapi kurang efektif. Adsorpsi zeolit pada konsentrasi $HDTMA^+$ 0.25 M, menunjukkan indikasi bahwa adsorpsinya terhadap ion Cd^{2+} lebih selektif dibandingkan ion Pb^{2+}.

SUMMARY

Zeolite is an aluminosilicate mineral whose three dimensional frameworks in its structure, having cavities and channels which related each other causing the surfaces become wide and effective as adsorbent. Beside that, zeolite having negative charge, can interact with charge compounds or molecules such as hexadecyltrimethylammonium ($HDTMA^+$).

It had been done the natural zeolite modification directly with $HDTMA^+$. The indirectly modification treatments with $HDTMA^+$ was done through dealumination process by mixing natural zeolite in hot water and then soaking it in salt solution of ammonium hexafluorosilicate (AHFS) 1 M for 3h at 90^0C. Modification process with $HDTMA^+$ was done by adding $HDTMA^+$ to 0, 0.125, 0.25, 0.50 and 1.00 M by shaking at 150 rpm at room temperature for 8h. Characterization of $HDTMA^+$ for both of natural zeolite and dealuminated one were done using FTIR spectroscopy. Adsorption test for lead(II) and cadmium(II) ion were done by mixing the zeolites on batch shaker at 150 rpm for 24h. Adsorbed Pb^{2+} and Cd^{2+} were determined by atomic absorption spectroscopy (AAS).

FTIR spectra showed that $HDTMA^+$ had been adsorbed onto both modified zeolites. It was showed by adsorption in the range of 2850,6 cm^{-1} and 2920 cm^{-1}. Adsorption intensity of natural zeolite was higher than the dealuminated one. Adsorption results indicated that the $HDTMA^+$ modified zeolite still had the capability to adsorb Pb^{2+} and Cd^{2+} ions although it was less effective. The adsorption of zeolite at $HDTMA^+$ 0.25 M indicated that its adsorption of Cd^{2+} was more selective than Pb^{2+}.

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